

Patent Claims

1. A device for pressure regulation of hydraulic pumps, in particular for oil pumps, having a delivery-quantity-regulating device for supplying lubricating oil to internal combustion engines, having a regulating piston and a regulating spring for controlling the delivery-quantity-regulating device, and having an activating device for the regulating piston, characterized in that the regulating piston (14, 51, 80) has an active surface (15, 53, 90) for continuously present oil pressure and can furthermore be subjected to an additional force by the activating device (23, 29, 56, 71, 73, 102).

2. The device for pressure regulation of hydraulic pumps as claimed in claim 1, characterized by the fact that, with regard to the formation of the activating device, at least one of the following features is provided:

- a) the activating device of the regulating piston (14, 80) is formed with a magnet coil (23) having an armature (24) which acts on the regulating piston (14, 80);
- b) the activating device of the regulating piston (14, 80) is formed with a stepping motor (29) for adjusting the spring system 30 of the regulating spring (17);
- c) the activating device is formed with a speed-dependent centrifugal valve having a switching piston (56) and a switching-piston spring (57);

- d) the activating device is formed with an electrovalve (71, 102);
- e) the activating device (23, 29, 71, 102) is formed in such a manner that, in an electrical system failure, it automatically raises the oil pressure to the maximum regulating-pressure stage,
- f) the activating device is formed with a spiral groove (73).

3. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that, with regard to the formation of the regulating piston (14, 80), at least one of the following features is provided:

- a) the regulating piston is formed as a step piston (51) having a second active surface (54) which can be subjected to oil pressure by the activating device (56, 71, 73, 102) or can be relieved of pressure;
- b) a stepped regulating piston is formed with multiple steps and is subjected to oil pressure by an activating device correspondingly formed with multiple steps.

4. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that the switching piston (56) is at an angular offset with its axis from the radial direction of centrifugal force.

5. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that the switching piston (56) and also the switching-piston spring (57) are arranged within a delivery gearwheel (55) with partial dipping into a delivery tooth.

6. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized in that the switching piston (56) has a guide pin (59) for the radial guidance of the switching-piston spring (57).

7. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that the oil pressure for pressurization of the active surfaces (15, 53, 54, 90) of the regulating piston (14, 51, 80) is branched off behind an oil filter (25, 89).

8. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that electric components of the oil-pump-regulating means (23, 29, 71, 82, 102) are arranged outside oil chambers and are connected to the oil pump (78, 86, 103) via hydraulic lines (87, 91).

9. The device for pressure regulation of hydraulic pumps as claimed in one or more of the preceding claims, characterized by the fact that the regulating piston (14, 80) is combined with the stepping motor (29) and with the magnet

coil (23) and/or the electrovalve (102) in a common housing (81, 101) to form a regulating unit (82, 100).